APPENDIX S

COMMUNICATIONS AND COMMUNICATIONS SECURITY

This appendix addresses all aspects of communications and communications security as required for motor transport operations.

S-1. COMMUNICATIONS SUPPORT. The theater army area communications system supports transportation units operating in the COMMZ. In the combat zone--throughout the corps rear area and the field army service area--the Army area communications system provides support. These systems or their extensions support installations such as HRPs and traffic control posts. They supplement the organic capabilities of motor transport units in establishing communications networks.

Units of the US Army Communications Command (theater) and the field army signal brigade install and operate theater and field army area communications systems. Each system is a network of area Army signal centers. High-capacity trunking systems interconnect the centers that send and receive messages for units in their areas. Center assets may include a telephone central, teletypewriter central, and communications center. Messenger service is usually provided among the various centers. However, units provide their own messengers to and from the area signal center. Each area signal center installs wire lines to units within its area. It also operates a radio wire integration station that interconnects FM radios with the common-user telephone system on a push-to-talk basis.

Distances between a transportation battalion headquarters and its companies usually exceed the organic wire-laying capability and may exceed the range of organic radios. Therefore, the area communications system provides the only communications net for motor transport units. Communications between a transportation unit and the agencies and activities it supports are also provided through this system. For these reasons, it is essential that each company and battalion headquarters be connected to an area signal center.

The signal units operating the area signal centers are equipped to install wire lines to all units within their areas of responsibility on a priority basis. Normally, areas of responsibility are specified by higher authority. Units outside their radius will not be afforded wire service.

A signal SOP from a higher authority usually stipulates the number of telephone circuits between a small extension node and a transportation battalion or company. This number of circuits will be installed by the area signal center upon notification of a unit's move into its area. When moves are planned, the appropriate signal center should be told of the move as far in advance as possible. This will help to ensure timely service to the unit.

The communications officer of each major command is responsible for allocating the type and extent of electrical communications within that command. Transportation unit communications policies and procedures must conform to those established by the major command.

S-2. UNIT COMMUNICATIONS EQUIPMENT. Communications equipment available to transportation units includes radios, telephones, radioteletypewriters, and messengers, as well as visual and sound media. Not all of these means are available to all units.

Radios authorized by TOE to transportation truck units are limited in both range and quantity. They are used mainly for internal communications. In other words, they provide for communication between the headquarters and elements of the unit, both in static and on-the-road operations. The company headquarters radio is used to contact higher headquarters (battalion) and supported and supporting units through a net radio integration facility. It can be used in rear area operations. It can also monitor the rear operations net.

Authorized switchboards and telephones are used to establish internal wire communications systems. The switchboards also terminate wire circuits from the telephone switching at area Army signal centers, thus establishing entry into the communications systems. This provides common-user wire communications between motor transport units and higher headquarters, adjacent units, and supporting and supported units.

S-3. COMMUNICATIONS PERSONNEL. At minimum, unit communications personnel should include a signal officer, radio operator, and switchboard operator. Their functions are critical to unit safety, security, and successful mission accomplishment.

a. **Signal Officer**. The individual designated by the unit commander as the signal officer directs and supervises all phases of the system and equipment and training of unit communications personnel. He should develop adequate communications control and signal operating instructions to take maximum advantage of alternate means of communications under all operating conditions. The signal officer keeps the commander informed of all communications matters and coordinates communications with higher, adjacent, supported, supporting, and subordinate units. In performing other duties, the signal officer--

- Prepares communications plans.
- Assists in the site selection for the unit command post.
- Supervises the installation, operation, and maintenance of the unit communications system.
- Determines communications equipment and supply requirements.
- Supervises or arranges the training of communications personnel, including the training of alternate operators.
- Prepares extracts of SOI for use by communications personnel.
- Maintains liaison with the appropriate node center supporting the area. FM 24-16 provides guidance to unit signal officers in preparing orders, records, and reports pertaining to communications.
- Prepares radio net and wire system diagrams based on organic communications equipment and its employment and nets outside the unit that the unit is part of or monitors. (FM 24-18 and TC 24-21 provide information to assist the unit signal officer in field radio and field wire techniques.)

b. **Radio Operator**. The radio operator is responsible for the proper use of the radio, including the use of correct procedures and adherence to communications security measures. He must be familiar with the SOI with respect to radio procedures, call signs, and security. He performs operator maintenance on his radio equipment. He must know the capabilities and limitations of the radio and must be familiar with the other facilities in the radio net of which the unit is a part.

c. **Switchboard Operator**. The switchboard operator installs, operates, and maintains the unit switchboard. He must know the procedures and techniques for installing and operating field telephone equipment, the capabilities and limitations of the equipment, and the facilities incorporated in the system to which his switchboard is connected. At company and battalion level, he also serves as wireman. He installs and maintains the field wire communications system and performs unit level maintenance on the field wire communications equipment. During the initial installation of the wire net, and depending on distance between unit elements, he may require the assistance of added personnel.

S-4. COMMUNICATIONS EQUIPMENT SUPPLY. Authorized items of communications equipment are prescribed in the TOE. Higher commanders may authorize additional equipment. Initial supply and replacement is made through normal supply channels. The supply sergeant, with the assistance of the signal officer, prepares and submits requisitions for the equipment and supplies.

Repair parts and special tools lists in the equipment technical manual establishes the allowance for stockage of repair parts. Quantities of repair parts authorized for operator maintenance are issued initially with the equipment and are authorized to be kept on hand by the operator.

S-5. MAINTENANCE OF COMMUNICATIONS EQUIPMENT. In motor transport units, the usual procedure for obtaining maintenance services beyond unit-level maintenance is to turn in the equipment to the direct support unit for repair or direct exchange.

Depending on established procedures, and if the attached units have no assigned repairmen, the battalion radio repairman may perform maintenance on unit equipment. Maintenance services beyond his capability are obtained through turn-in of the equipment to the appropriate direct support units.

S-6. SIGNAL OPERATING INSTRUCTIONS. Signal operating instructions are a type of combat order issued for the technical control and coordination of communications within a command. They include current and up-to-date information covering radio call signs and frequencies, a telephone directory, and visual and sound signals. The designated battalion signal officer prepares the battalion SOI in conformance with the SOI of higher headquarters. Truck units attached to the battalion headquarters use only extracts from the battalion SOI. If SOIs are classified, copies of extracts must be safeguarded according to their security classification.

Communications procedures that may be standardized are made a part of the unit SOP. The SOP must not violate instructions disseminated in other types of official publications from higher headquarters.

S-7. WIRE COMMUNICATIONS. Wire communications, which can be used across most terrain and in most situations, include the use of field wires, wire laying and recovery equipment, battery-operated telephones, a switchboard, and associated equipment. Except for the transmission of involved messages, maps, or lengthy documents, wire communication is highly effective. It affords person-to-person conversation with break-in operation (capability of interrupting the conversation) and is generally more secure than radio communication (Figure S-1, page S-4). However, security is never assured when transmitting in the clear.

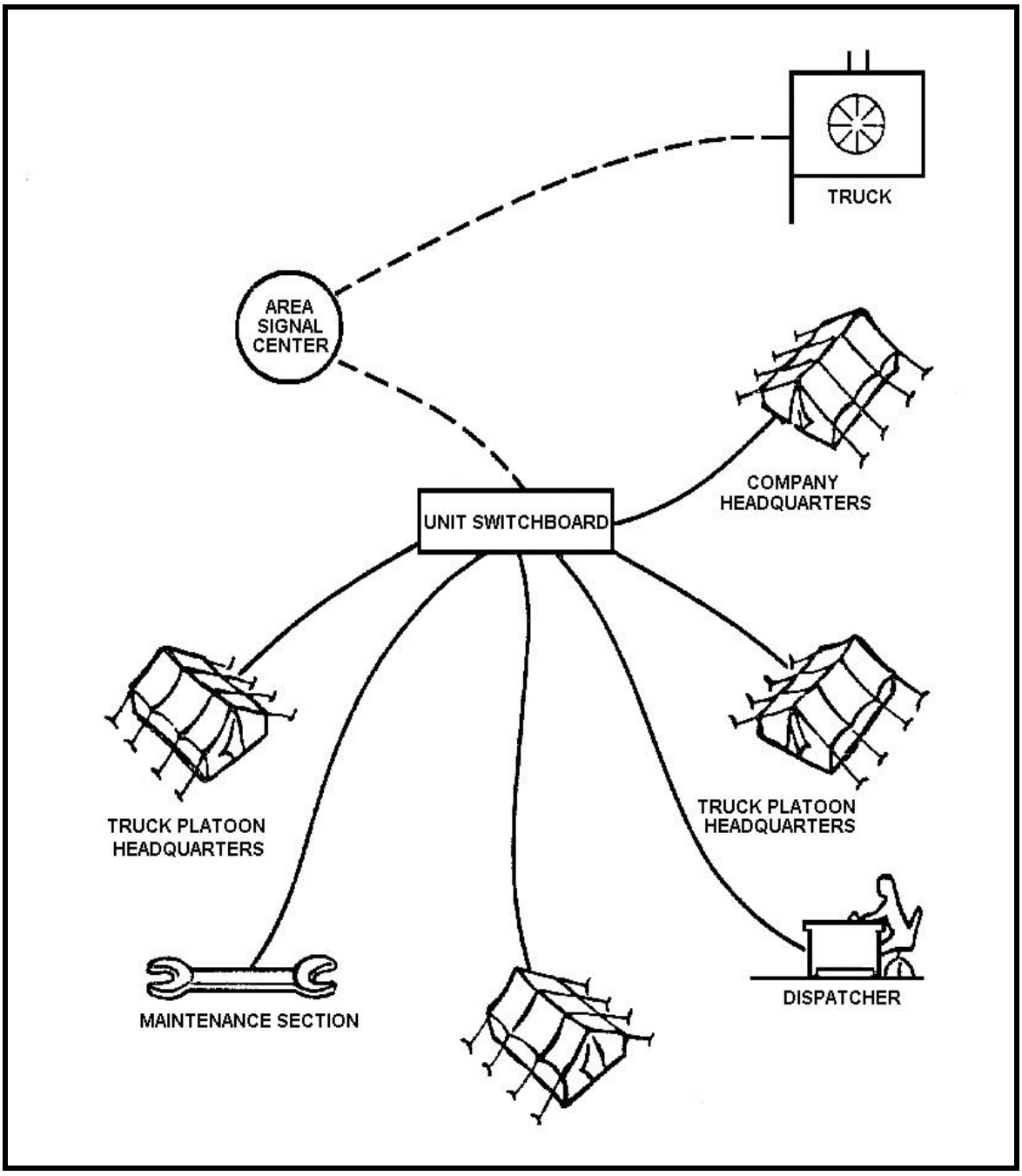

Figure S-1. Typical telephone wire net, transportation truck company

Using battery-operated telephones, the maximum operating range of point-to-point field wire circuits is about 14 to 22 miles (22.5 to 33.5 kilometers). The range of wire communications varies, depending mainly on weather and condition of the wire. Wet weather, poor splices, and damaged insulation reduces the operating range appreciably.

Only a limited number of telephones are made available to a unit by its TOE, and the best possible use should be made of them. Regardless of assignment of the telephones by the TOE, some telephones may be used for purposes other than those for which they are intended. For instance, during the hours of darkness it may be necessary to place all telephones (except those of the commanding officer and the dispatcher) on the perimeter for use by LP/OPs and crew-served weapon positions.

Upon arrival in a new area, emphasis should be placed on immediate installation of telephone lines. First priority should go to the commander, followed by the LP/OPs, then the dispatcher, and finally the operating and maintenance elements.

The time required for wire installation depends mainly on the length of the line and the method by which it is laid (vehicle or manpack). Consider the terrain, routes, weather, enemy action, and visibility in estimating the time required to install a wire net.

Switchboards increase the flexibility of the wire system and reduce the number of wire lines needed. All telephones should be connected to the unit switchboard, which is tied in to the area signal center. The unit switchboard enhances communication with supported and supporting units, higher headquarters, and adjacent units.

Telephones are a quick, efficient means of communication. They should not be used for long reports or orders when more appropriate means are available. During critical periods, use of telephones may be restricted to designated personnel (with the exception of emergency calls).

S-8. RADIO COMMUNICATIONS. Area communications system telephones and facilities are supplemented by comparatively short-range FM radio sets. These sets are used for mobile operations or to supplement common-user communications facilities. Units may also be authorized amplitude-modulated radio teletypewriters. The communication requirements of the unit's mission determine the type and extent of radio facilities provided. See the applicable TOE for specific types and quantities of radio equipment authorized.

Companies are normally provided FM voice radio sets to supplement organic wire systems. These sets are used for the following:

- Control of road movements.
- Command and control of company elements operating away from the company area.
- Communication with higher headquarters when distances permit.

The radios are mounted in vehicles organic to the company. The principal company radio is mounted in the commander's vehicle. Figure S-2, page S-6, shows a sample company radio net.

Radio is particularly vulnerable to enemy EW activities since its radiated electromagnetic energy may be readily detected, intercepted, analyzed, and exploited.

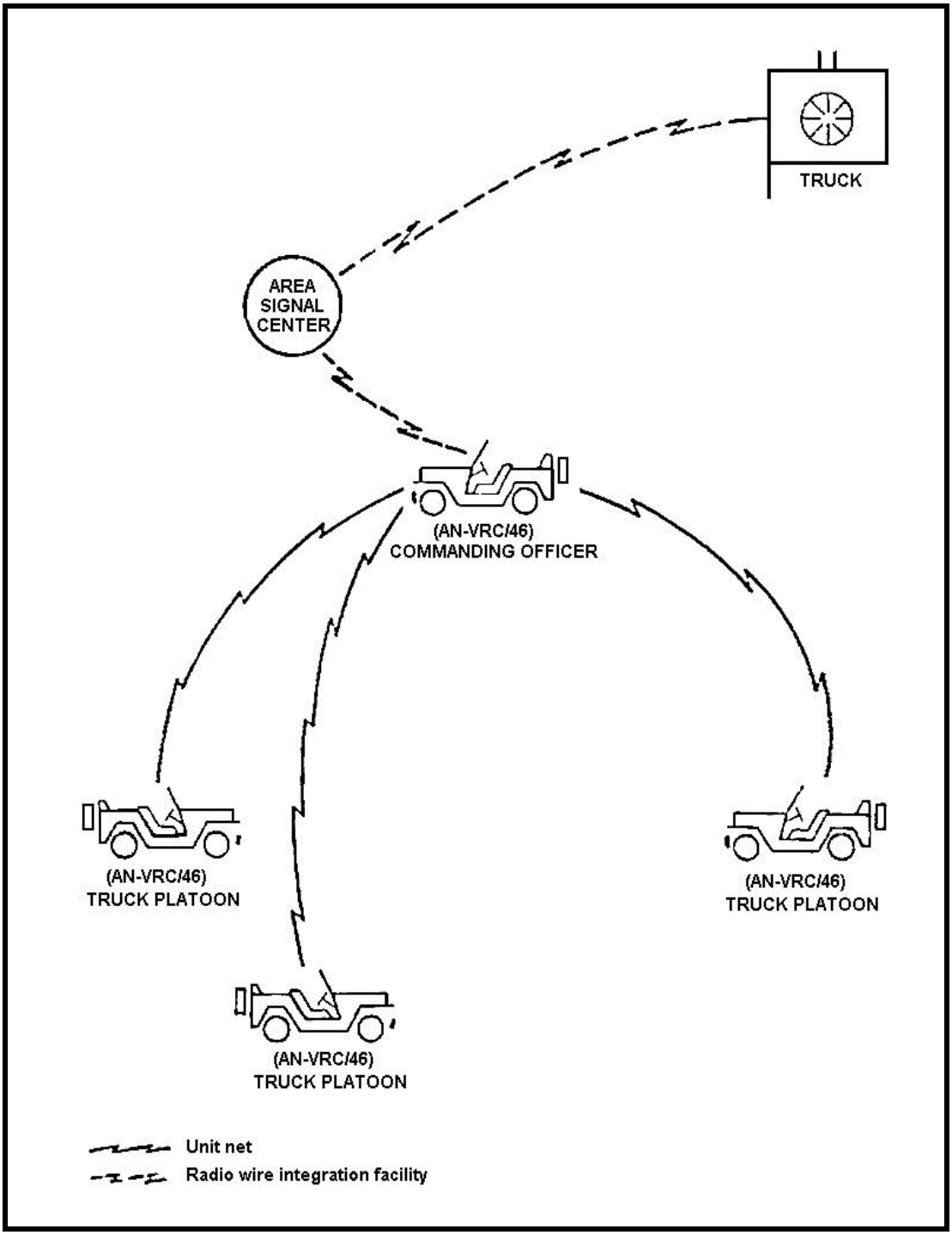

Figure S-2. Typical radio net, transportation truck company

S-9. MESSENGERS. Messenger service is the most effective means of transmitting and delivering lengthy messages and bulky items. Units use messengers to pick up from and deliver to the battalion headquarters or the nearest signal center. Messenger service should be confirmed by other communications or a follow-up message. Although they provide a flexible and reliable service, messengers are vulnerable to enemy action and do not afford the person-to-person conversation provided by communications equipment.

S-10. VISUAL COMMUNICATIONS. Means of visual communications available to all units include flags, lights, pyrotechnics, panels, arm-and-hand signals, and other prearranged visual means.

To preclude attack during movement, transportation units may communicate with friendly aircraft using panel sets. These sets are also used to guide friendly aircraft conducting air-to-surface action in the vicinity of the transportation unit and to indicate drop or landing zones. The panel system and panel recognition code for communication with aircraft is normally spelled out in the unit SOI. Colored smoke provides a ready means for both air and ground communications. For details on the use of panels and other visual signals, see FM 21-60.

S-11. SOUND COMMUNICATIONS. Sound is a supplementary means of communication. Sound signals are kept simple to prevent misunderstanding. They are transmitted by whistles, horns, Klaxons, weapons fire, and other noise-making devices. They are used chiefly to attract attention, to transmit prearranged messages, and to spread alarms. Sound signals are vulnerable to interception, and their use may be prohibited for security reasons. Such signals and their meanings are assigned by commanders. Warning of air, ground, and chemical, biological, or nuclear attack is usually given by this means.

S-12. COMMUNICATIONS SECURITY. Communications security can be defined as follows: that protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from the possession and study of telecommunications or mislead unauthorized persons in their interpretations of the results of such possession and study. The following qualifies as COMSEC:

- Cryptosecurity.
- Transmission security.
- Emission security.
- Physical security of communications security materials and information.

The unit commander should ensure that COMSEC measures are understood and observed by all unit personnel using communications equipment.

Motor transport unit personnel are concerned with all types of COMSEC. However, physical security and transmission security are of primary concern.

a. **Physical Security**. Physical security is the component of COMSEC that results from all physical measures taken to safeguard classified equipment, material, and documents from access or observation by unauthorized personnel. Before vacating a command post or other facility used for communications purposes, check thoroughly for copies of messages or carbons and copies of maps

or orders that might prove beneficial to the enemy. Give special attention to SOI items, including their production, distribution, storage, and final disposition when superseded or no longer needed. When an SOI item or an extract of an SOI item is believed to be lost or otherwise compromised, the fact must be reported and the item replaced immediately. The unit commander must specify in the unit SOP precisely how the report is to be made. As a minimum, he usually requires security violations to be reported immediately through communications and command channels.

b. **Transmission Security**. Transmission security is that component of COMSEC that results from all measures designed to protect transmissions from interception and exploitation by means other than cryptoanalysis. Radio is particularly susceptible to interception, direction finding, traffic analysis, and deception. Thus, radio operators must be thoroughly trained in correct communications procedures. They must also be constantly alert so as not to divulge information to the enemy through faulty operating procedures and techniques. Personnel preparing messages for transmission, as well as radio operators, must be aware of the ability of the enemy to obtain information from radio traffic.

S-13. COMMUNICATIONS TRAINING. Normally, communications specialists are trained either at service schools or at unit schools established within the command. When necessary, arrangements for the required training of these specialists may be made through the command's signal officer. At the same time, officers and other communications users may be given general training on radiotelephone procedures, telephone procedures, message writing, and communications security.

The unit signal officer must ensure that all members of the company engaged in communications-electronics have sufficient training to perform their jobs in an efficient and effective manner. Units should be trained in installing, operating, and maintaining their communication systems in fast-moving situations, under all conditions of weather and visibility, and over all types of terrain. All phases of communications training should include COMSEC and electronic counter-countermeasures training.

S-14. COMMUNICATIONS SECURITY PRECAUTIONS. The radio operator guidelines listed here are recommended for observing security practices and precautions. Compliance reduces the possibility of security leaks during radio transmissions. These guidelines should be used by switchboard operators and telephone operators and users. Many also apply to wire communications. They are as follows:

- Do not violate radio silence.
- Do not transmit in a directed net without permission.
- Do not make unnecessary transmissions, such as excessive testing.
- Do not transmit faster than can be received.
- Do not use more transmitting power than necessary.
- Do not tune transmitters with the antennas connected.
- Do not use excessive time to tune, change frequency, or adjust equipment.
- Transmit all messages by the most secure means available.
- Use prescribed radiotelephone procedures to transmit clear-text messages by voice radio.
- Preplan the wording and content of all messages to be transmitted.
- Use prescribed authentication systems and eliminate all unnecessary transmission.

- Carefully consider replies before answering inquiries received by radio. This reduces the possibility of a slip of the tongue that may give out information useful to the enemy.
- Practice and maintain a high standard of net discipline at all times.
- Use message books in preparing messages for transmission. Besides aiding and improving communications security, this practice will provide a record of messages for later reference.
- Use communications channels, both radio and telephone, for transmitting official information only.

Operators are strictly prohibited from using these facilities for personal conversations.

- Use only authorized codes. Locally devised systems can easily be broken by the enemy.
- Make transmissions as brief as possible.
- Never mention rank when transmitting messages.
- Do not use actual names.
- Use prescribed phonetic alphabet.
- Use prowords to limit transmission time.
- Do not use the same authentication twice.
- When in doubt, make the caller authenticate.
- Do not underestimate the enemy's ability to monitor your transmissions.